

REMARKSSummary

This Amendment is responsive to the Office Action mailed on August 14, 2003. Claims 1, 51, 53, and 68-70 are amended. Claims 38 and 55 are cancelled. Claims 36, 37, 39-54, 56-70 are pending.

As a preliminary matter, Applicant notes that the Office Action did not include an initialed copy of Applicants' PTO-1449 forms submitted with Applicant's Information Disclosure Statement filed on June 5, 2002. Applicant submits herewith a copy of Applicant's PTO-1449 form and respectfully requests that the Examiner initial and return this form with the next correspondence.

ok The Examiner has objected to the drawings as failing to show the weights described on page 19, fifth paragraph. Applicant submits herewith a replacement drawing for Figure 6, wherein the weights are shown in dashed lines and are designated by reference numeral 300. Approval of the proposed corrections to Figure 6 is respectfully requested, together with the withdrawal of the objections to the drawings. If the Examiner has any questions regarding the drawing corrections, or requires any further changes to the Drawings, he is requested to contact Applicant's undersigned counsel.

ok The Examiner has objected to the specification, as reference numeral 60 is incorrectly used to refer to the rotating cutting tool on page 12. The specification is amended herein to change reference numeral "60" to "80" as required by the Examiner. The specification is further amended on page 19 to include reference numeral 300 for the weights in accordance with the drawing corrections to Figure 6 discussed above.

Claims 49-51 and 66-68 stand rejected under 35 U.S.C. § 112, first paragraph, as failing to comply with the written description. The Examiner indicates that in claims 49 and 66 it

is not clear how "the diameter of a supporting ring is adjustable" and how the "expansion device" radially expands the supporting ring. Claims 49-51 and 66-68 are also rejected under 35 U.S.C. § 112, second paragraph, as being indefinite for the same reasons.

Applicant respectfully submits that the claim language identified by the Examiner is supported by the specification (See, e.g., Applicant's specification at page 5, last paragraph through page 6, last paragraph; see also page 15, last paragraph, through page 17 second to last paragraph). The expansion device acts to radially expand the supporting rings, thereby adjusting its diameter. The extent to which the supporting rings can be expanded depend on the limit of elastic expansion of the supporting ring material. It is well-known by those skilled in the art that every metal possesses the ability to expand to some degree without becoming deformed. As discussed on pages 5-6 of Applicant's specification, when a new cutting edge is used, the supporting rings may be radially expanded a maximum amount below the elastic expansion limit. As the cutting edge is worn down, the expansion may be reduced by the expansion device such that the diameter of the supporting ring is reduced to compensate for the wear on the cutting edge.

Further, Applicant's specification at page 6 refers to German patent application no. 100 40 024.8, which provides additional details about the operation of the expandable supporting rings. German patent application no. 100 40 024.8 is the priority application to co-pending U.S. patent application no 09/930,671. A copy of Applicant's co-pending application no. 09/930,671 is submitted herewith. The Examiner is referred to pages 2-5 and 10-13 and Figures 5-7 for details regarding the operation of an example expansion device which acts to radially expand the supporting rings.

o/ Claims 51 and 68 stand rejected under 35 U.S.C. § 112 as being indefinite, as the Examiner indicates that no antecedent basis is provided for "the expansion" in these claims. Claims 51 and 68 are amended to depend from claims 49 and 66, respectively, thereby providing antecedent basis for "the expansion".

Withdrawal of the rejections under 35 U.S.C. § 112 is respectfully requested. If there are any questions about the operation of the expansion device or the expandable supporting rings, the Examiner is encouraged to telephone Applicant's undersigned counsel.

Claims 36, 37, 38, 52, 53, 54, 55, 69, and 70 stand rejected under 35 U.S.C. § 103(a) as being unpatentable over Kesten (US 4,455,903) in view of Strouse (US 5,857,396).

Claims 39-48 and 56-65 stand rejected under 35 U.S.C. § 103(a) as being unpatentable over Kesten and Strouse in view of Wilson (US 5,452,634).

Claims 49-51 and 66-68 stand rejected under 35 U.S.C. § 103(a) as being unpatentable over the combination of Kesten, Strouse, and Wilson, in view of Mayer (US 5,074,180).

Applicant respectfully traverses these rejections in view of the comments which follow.

Discussion of Amended Claims

Claim 1 is amended to include the subject matter of claim 38. Claim 53 is amended to include the subject matter of claim 55. Claims 38 and 55 are cancelled to avoid duplication of subject matter.

Claims 69 and 70 are amended to include the subject matter of claim 38.

Claims 51 and 68 are amended herein to depend from claims 49 and 66, respectively, in order to provide antecedent basis for the term "the expansion".

Discussion of the Present Invention

Applicants' cutting tool is biased or pre-stressed essentially parallel to its axis of rotation by bracing the cutting tool with such a force that a maximum oscillation amplitude of the cutting tool is below a predetermined value.

It has been shown in practice that cutting tools, in particular, cutting tools having a large span and/or small diameter are subject to transverse oscillations, which are caused by lateral cutting forces, transverse to the axis of rotation during a cutting procedure. These oscillations, which are oscillations of the cutting tool itself, may be reduced with respect to the amplitude and/or may be excited to a reduced degree when the cutting tool is biased in accordance with the present invention. This effect corresponds to that of an oscillating string which is tensioned: In this case, the amplitude is reduced (and the frequency increased) when a tensile stress is exerted on the string with an unchanged force excitation in comparison with a non-tensioned state. Accordingly, a greater force action is necessary to achieve the same amplitude in the tensioned state.

In accordance with the present invention, the mode structure of the cutting tool is altered by the biasing in such a manner that oscillations are reduced which are caused by lateral cutting forces. As a result, the quality of the cut when cutting a work piece web is increased and the service life of the cutting tool is increased, since the load on the cutting edge is reduced.

It has been shown that in accordance with the present invention a maximum oscillation amplitude of less than 2 μm in the center of a cutting tool may be achieved due to the biasing of the cutting tool having a span of 700 mm and a diameter of 300 mm.

The increase in the intrinsic frequencies of the cutting

tool by means of the biasing also has a favourable effect on the oscillation excitability of the cutting tool. Low machine frequencies, in particular, contribute to an oscillation excitation of the cutting tool. If its intrinsic frequencies are increased, the oscillation excitability of the cutting tool is reduced (see, e.g., Applicant's specification, page 2, first through last paragraphs).

Discussion of Cited References

The examiner asserts that the subject matter of the present invention is obvious over Kesten in view of Strouse.

The examiner correctly acknowledges that Kesten does not disclose a cutting tool biased essentially parallel to its axis of rotation.

Strouse discloses a slitting machine adapted for slitting thin sheets of material. The slitting machine of Strouse comprises a base, a head stock 32 mounted to the base, and a tail stock 33 mounted to the base. A pair of arbors 25, 26 for carrying knives to slit the sheet material fed through the machine is provided. Each of the arbors is rotatably mounted in eccentrics which are rotatable in the head stock 32 and tail stock 33 to move the arbors toward each other and into a slitting position and away from each other to permit installation or removal of the knives (Col. 3, lines 33-60; Col. 4, lines 37-51; and Col. 9, line 63 to Col. 10, line 4).

Strouse specifies that it is important that the arbors are accurately positioned with respect to the machine's frame and with respect to each other (Col. 1, lines 57 to 59). Strouse discloses means for eliminating axial play between the arbors and the head stock and the arbors and the tail stock by applying an axial force from the head stock through the arbors to the tail stock (Col. 10, lines 5 to 8). This means includes a piston and a cylinder acting between the head stock and the tail stock to draw

them (the head stock and the tail stock) together (Col. 10, lines 30 to 32). An axial force can be applied which tends to press the arbors 25 and 26 toward the left and to press the tail stock 33 toward the right (Col. 6, lines 38 to 41). The consequence of applying this axial pressure is that all play in the tapered roller bearings which support both ends of the arbors 25 and 26 and in the ball bearings which support the eccentrics in the head stock 32 and tail stock 33 is eliminated, and the arbors 25 and 26 are precisely located (Col. 6, lines 41 to 47).

However, the forces discussed in Strouse are effective between an arbor with respect to the tail stock and head stock. Strouse does not disclose or remotely suggest that the arbors are biased with respect to the cutting tools themselves to reduce oscillations of the arbors with respect to amplitude.

The examiner states that it would have been obvious to provide a cutting tool biased essentially parallel to its axis of rotation in Kesten as taught by Strouse in order to eliminate axial play in all the bearings (Office Action, page 4). However, the biasing of the cutting tool in accordance with the present invention is not for eliminating axial play in the bearings; the biasing force provided by the present invention influences the oscillations of the cutting tool itself in a positive way, that is, the biasing reduces amplitude and/or causes excitation to a reduced degree and increases oscillation frequencies.

Strouse does not disclose or remotely suggest that the cutting tool is biased essentially parallel to its axis of rotation by bracing the cutting tool with such a force that a maximum oscillation amplitude of the cutting tool is below a predetermined value.

Further, Wilson and Mayer do not disclose or remotely suggest the biasing of a cutting tool.

Applicant respectfully submits that the present invention would not have been obvious to one skilled in the art in view of the combination of Keston and Strouse, or any of the other references of record.

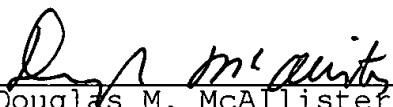
Withdrawal of the rejections under 35 U.S.C. § 103(a) is therefore respectfully requested.

Further remarks regarding the asserted relationship between Applicant's claims and the prior art are not deemed necessary, in view of the amended claims and the above discussion. Applicant's silence as to any of the Examiner's comments is not indicative of an acquiescence to the stated grounds of rejection.

Conclusion

In view of the above, the Examiner is respectfully requested to reconsider this application, allow each of the presently pending claims, and to pass this application on to an early issue. If there are any remaining issues that need to be addressed in order to place this application into condition for allowance, the Examiner is requested to telephone Applicant's undersigned attorney.

Respectfully submitted,



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